
(From the Laboratory of Physiology, Yale University School
of Medicine.)

**THE INFLUENCE OF BOERHAAVE'S INSTITUTIONES
MEDICÆ ON MODERN PHYSIOLOGY,**

BY

J. F. FULTON, M. D., *New Haven, Conn.*

(WITH TWO TABLES.)

Overgedrukt uit het NEDERL. TIJDSCHRIFT VOOR GENEESKUNDE
— Jaargang 82, No. 40. (4860—4866). Zaterdag 1 October 1938. —



22200167777

(From the Laboratory of Physiology, Yale University School
of Medicine.)

THE INFLUENCE OF BOERHAAVE'S *INSTITUTIONES
MEDICÆ* ON MODERN PHYSIOLOGY,

BY

J. F. FULTON, M. D., New Haven, Conn.

(WITH TWO TABLES.)

In the year 1708 there appeared from the press of JOHAN VAN DER LINDEN a small book which quickly raised Physiology from the nebulous sphere of the amateur to the dignity of an academic discipline. Before this time the science of bodily function — not yet termed „physiology” — had been advanced by many persons, usually individuals without university connection, such as GALEN, LEONARDO DA VINCI, HARVEY and ROBERT BOYLE; but prior to 1708 Physiology as a separate field of study had not become an integral part of the curriculum of any university, or of any school of medicine. All this became changed about 1700 when HERMAN BOERHAAVE had begun to deliver his lectures on the “Institutes of Medicine”, and when in 1708 he issued the first printed edition of these memorable lectures under the title *Institutiones medicæ, in usus annuæ exercitationis domesticos* (figs. 1 and 2), they were eagerly read by his own students at Leyden, and by a host of teachers and students elsewhere in Europe. *Institutiones medicæ* has been many times reprinted, translated into many tongues, and the rarity of the first edition no doubt bears testimony of its conspicuous popularity 1).

1) The edition of 1708 is found in few libraries, and I know of only three copies outside Holland; Sir WILLIAM OSLER, a devoted disciple of BOERHAAVE, sought this book for many years without success. The title-page and binding of a copy recently obtained through Mr. E. W. BLIGH in London is shown in Fig. 1, and a full bibliographical description of the book is given below in the Appendix.

The circumstances which led BOERHAAVE to prepare these lectures and to publish his book are not well known, and little information is available concerning their background. Evidently, however, BOERHAAVE — then forty years of age and an experienced teacher — was dissatisfied with his students' knowledge of the basic sciences; he therefore set out to give them a course of lectures in general physics and biology in order to prepare them for their clinical studies. After a preliminary lecture, in which he urges that Medicine be studied first as a science and later as an art, he takes up certain physical phenomena such as the properties of gases and fluids. The introductory section is headed "Prolegomena" and after disposing of physics and chemistry he enters upon the second part of his prolegomena which he heads *Φυσιολογική*, i.e. "physiological" prolegomena. This is the first time the term "physiology" had been thus used to characterize the study of bodily functions. The term caught hold and is now the accepted designation of our science 1). The German translation of BOERHAAVE's "Institutes" was appropriately designated "Physiologie" (see Appendix).

Following his significant "Prolegomena" BOERHAAVE takes up, much in the modern manner, such physiological functions as mastication, deglutition, gastric function, the mode of formation of bile and chyle, defecation and micturition; he then has an excellent section on the physiology of the heart, the lungs, and general circulation. His account of the functions of the cerebrum and cerebellum hark back to the days of GALEN, but the discourse on glandular function shows him to have been a keen observer and a man who thought in physiological terms. There are chapters on muscular contraction, on the general physiology of nerve, and several striking sections on the special senses. The book ends with a brief statement of the more important clinical applications of his physiological teaching; thus he classifies the pulse and devotes considerable space to the significance of its variations. There is a good section on neurological disorders and a general discussion of the principles of hygiene.

This little book of 250 pages caught the imagination of teachers in every land, but especially in the British Isles. There were not less than 23 separate editions in Latin, one of which was published at Edinburgh (1752, see Appendix). The first five Leyden editions BOERHAAVE supervised personally. There were also many translations, especially into English; the earliest I have found is a plagiarized rendering by one "J (ONAH) BROWNE L.L. M.D." entitled *Institutions in Physick*; it passed through two editions in 1714 (fig. 3) and 1715. Another rendering by "Mr. SAMBER" appeared in London in 1719 under the title *A Method of studying physick*, the title-page of which is reproduced in fig. 4. Better known is a

1) *Φυσιολογία*, and its Latin equivalent, *physiologia*, had been used by classical writers to signify all natural knowledge; it was employed in this sense by BOYLE and others in the seventeenth century. The restriction to functional biology is due to its adoption in this more limited sense by BOERHAAVE, HALLER and others in the eighteenth century.

later anonymous translation published in six volumes in 1742 under the title *Dr. BOERHAAVE's academical lectures on the theory of physick. Being a genuine translation of his Institutes. . . . as they were dictated to his students at the University of Leyden* (2nd ed., 1766—73). If one overlooks a rather primitive work entitled *Natural history of nutrition, life and voluntary motion*, published in 1659 by WALTER CHARLTON, which in a sense is a physiological text, and a curious Galenical text of 1697 by J. PECHY designated *A plain introduction to the art of Physick containing the fundamental and necessary preliminaries to practice*, these early translations of BOERHAAVE may be regarded as the first textbooks of physiology in the English language. The French translation in 1740 and the German in 1754 similarly are among the earliest physiological texts in those languages (see Appendix). ALBRECHT VON HALLER was born in 1708, the year BOERHAAVE published his *Institutiones*, and the fact that HALLER as a young man brought out several editions of the *Institutiones* indicates that the book must have influenced his career as a physiologist; and it is undoubtedly significant that HALLER, adopting BOERHAAVE's new term, did more to establish Physiology as a separate academic discipline than anyone in the eighteenth century save BOERHAAVE himself. HALLER's celebrated *Primae Lineae Physiologiae* first appeared in 1751 (English translation by CULLEN, 1779), and his monumental *Elementa physiologiae* in 1757—66 (7 vols.).

The large influence which BOERHAAVE's lectures had in British medicine may be inferred from the following facts. The medical faculty at Edinburgh was reorganized in 1726, four professors being appointed as follows: (i) *Materia medica*, (ii) Midwifery, (iii) Military surgery, and (iv) the Institutes of Medicine. ANDREW SINCLAIR, the first to hold the chair of the Institutes, used as his only textbook BOERHAAVE's *Institutiones medicae*, and the name of his chair in its English form was taken directly from the title of BOERHAAVE's book. As a result of this the chairs of physiology in all Scottish universities, as well as in the English provinces, until shortly after WILLIAM RUTHERFORD's appointment at Edinburgh in 1874, bore the title "Institutes of Medicine" rather than "Physiology". WILLIAM OSLER, for example, shortly after his graduation at MCGILL was appointed to teach the "Institutes" at his Alma Mater.

ANDREW SINCLAIR was evidently not an inspiring teacher. He lectured in Latin, and while he read from a good text he merely repeated BOERHAAVE's discourses without change. His health failed in 1747 and he was succeeded by one of this most vigorous and original physiologists of all time, ROBERT WHYTT (1714—1766). On succeeding to the chair of the Institutes, WHYTT first used BOERHAAVE's *Institutiones medicae*, even though its author had been dead for nearly ten years. Later, as his reputation grew, he changed from the *Institutes* to the *Pathologia* of GAUBIUS, and substituted for collateral reading his own writings, particularly the *Treatise on the vital and other involuntary motions in animals* (1751). This established the concept of the reflex for the first time and

did much to advance the cause of experimental physiology. ROBERT WHYTT was in many ways as vigorous an intellect as BOERHAAVE himself, and from every point of view he was a worthy successor to a chair created as a result of BOERHAAVE's influence. WHYTT was succeeded in 1766 by WILLIAM CULLEN, also a powerful intellect, who like WHYTT was an arch disciple of BOERHAAVE, as well as being a courageous and original thinker. The later history of this epoch-making chair is fully described in Sir ALEXANDER GRANT'S *The story of the University of Edinburgh during its first three hundred years*, published at London in 1884 in 2 volumes.

Chairs of the Institutes and of Physiology were little by little established in the universities and for the sake of record more important ones may be listed.

<i>Place</i>	<i>Year</i>	<i>Title</i>
Edinburgh	1726	Institutes of Medicine (changed to Physiology in 1874).
Philadelphia	1789	Institutes of Medicine (Physiology 1878).
Guys Hospital (London)	1823	Physiology and Midwifery.
University College (London)	1826	Anatomy and Physiology.
Basel	1835	Physiologie und Pathologie..
Kings College (London)	1836	Physiology (not full time).
Glasgow	1839	Theory of Physic & Institutes of Medicine (changed to Physiology 1893).
Utrecht	1849	Physiology.
Zürich	1849	Anatomy and Physiology.
Leyden	1866	Physiology.
Oxford	1882	Physiology.
Cambridge	1883	Physiology.

U.S.A.

Western Reserve	1843	Anatomy and Physiology (Physiology after 1870).
Buffalo	1846	Physiology and Med. jurisprudence.
Virginia	1855	Institutes of Medicine.
Harvard	1876	Physiology (full time).
Boston University.....	1873	Physiology.
Yale	1879	Physiology (part time).
Johns Hopkins	1893	Physiology (full time).



Fig. 1.

J. F. FULTON, THE INFLUENCE OF BOERHAAVE'S
INSTITUTIONES MEDICAE ON MODERN PHYSIOLOGY.

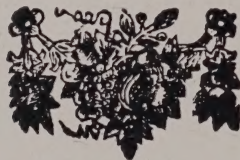
INSTITUTIONES
MEDICÆ,

In usus annuæ
EXERCITATIONIS

DOMESTICOS,

Digestæ ab

HERMANNO BOERHAAVE.



LUGDUNI BATAVORUM,
Apud JOHANNEM vander LINDEN. P. & F.,
MDCCVIII,

Fig. 2.

J. F. FULTON, THE INFLUENCE OF BOERHAAVE'S
INSTITUTIONES MEDICAE ON MODERN PHYSIOLOGY.

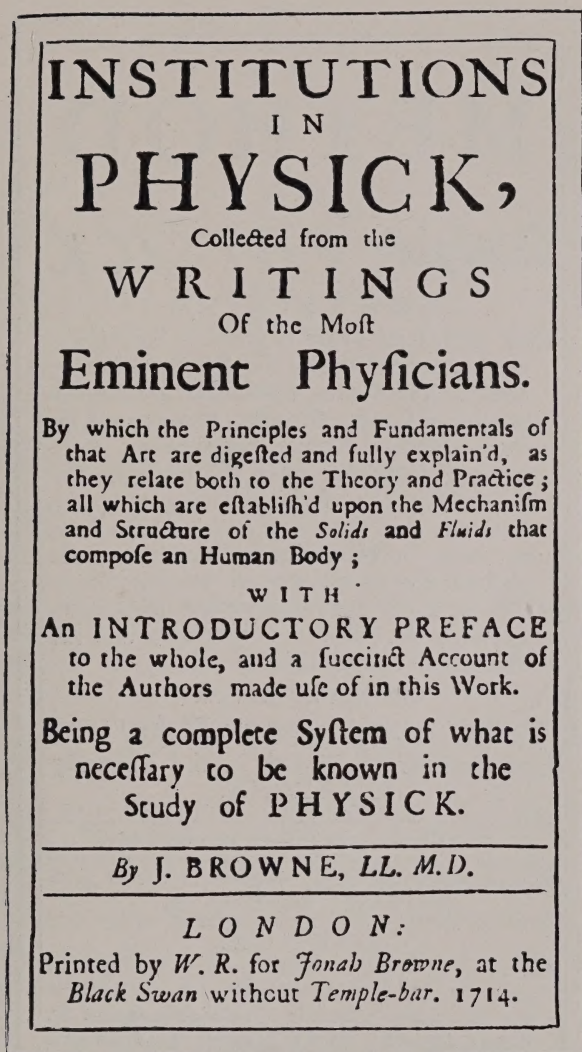


Fig. 3.

J. F. FULTON, THE INFLUENCE OF BOERHAAVE'S
INSTITUTIONES MEDICAE ON MODERN PHYSIOLOGY.

A
METHOD
 OF
Studying **PHYSICK.**

CONTAINING

What a Physician ought to know in Relation to
 the Nature of Bodies, the Laws of Motion ;
Statics, Hydrostatics, Hydraulicks, and the Pro-
 prieties of Fluids: *Chymistry, Pharmacy* and Bo-
 tany: *Osteology, Myology, Splanchnology, Angio-
 logy* and *Dissection*: The Theory and Pra-
 ctice of Physick: *Physiology, Pathology, Surgery,*
Diet, &c. And the whole *Praxis Medica Inter-
 na*; with the Names and Characters of the
 most excellent Authors on all these several Sub-
 jects in every Age: *Systematics, Observators,*
Operators, &c. their best Editions, and the
 Method of reading them.

Written in *LATIN*

By the Learned HERMANN BOERHAAVE,
 Now Professor of Physick in the University
 of *LEYDEN.*

Translated into English by Mr. SAMBER.

*Medicum creavit Altissimus. Altissimus creavit de Terra
 Medicinam. Eccles. cap. 38.*

L O N D O N:

Printed by H. P. for C. RIVINGTON at the Bible and
 Crown in St. Paul's Church-yard; B. CREAKER at
 the Bible and Ink-Bottle in Fenchurch-street against St.
 James's Church; And J. SACKFIELD in Lincoln's-
 Inn-Square. MDCCXIX.

Price Five Shillings.

Fig. 4.

J. F. FULTON, THE INFLUENCE OF BOERHAAVE'S
 INSTITUTIONES MEDICAE ON MODERN PHYSIOLOGY.

Place Year Title

GERMANY.

Breslau	1811	Physiologie und Pathologie.
Marburg	1837	Physiologie 1)
Königsberg	1849	„
Tübingen	1853	„
Kiel	1855	„
Heidelberg	1857	„
Berlin	1858	„
Bonn	1859	„
Jena	1860	„
München	1863	„
Leipzig	1865	„
Würzburg	1865	„
Freiburg	1867	„
Halle	1870	„
Strassburg	1872	„

Conclusion.

Physiology as an academic discipline was born in Holland in the early eighteenth century, having been brought into being by a great clinician to meet the needs of clinical medicine. BOERHAAVE gave the term “physiology” its modern connotation and his book *Institutiones Medicæ* may be regarded as the earliest physiological text intended primarily for medical students. The English translations of the “Institutes” which appeared in 1714, 1715, 1719 and 1742 are the earliest general textbooks in the English language, and the first professorship of physiology in the world was founded, not at Leyden, but in 1726 at Edinburgh as a direct result of BOERHAAVE’s influence; it was called chair of the “Institutes of Medicine”. So it is fit that we do honour to a book that still lives in the 220th year of its age — and that we offer our gratitude to its revered author.

BIBLIOGRAPHICAL APPENDIX.

The full bibliographical description of the first edition of the *Institutiones medicæ* is as follows:

Title: Institutiones / Medicæ / In usus annuæ / Exercitationis / Domesticos, / Digestæ ab / HERMANNO BOERHAAVE / [device] / Lugduni Batavorum / Apud JOHANNEM VANDER LINDEN. P. & I / MDCCVIII. /

1) Original title often not available: in Germany, however, the phrase “Institutes of Medicine” was not used in connection with the physiology chairs.

Collation: 12°; *² A-K¹² L⁶; 2 leaves, 250 pp., 1 leaf.

Contents: (*) 1a title; (*) 1b blank; *2a-*2b "Auditoribus" dated "Lugduni Batav. 20. Septemb. 1707"; Ala-L5b (pp. 1-250) text divided into 1002 numbered paragraphs; L6a Addenda; L6b blank.

Notes: In the first edition there are no chapter subdivisions and no table of contents. The signatures are continuous and there are no errors of pagination.

Copies: FULTON (see fig. 1; obtained in 1936 through Mr. E. W. BLIGH), Brit.Mus., SINCLAIR, Amsterdam Univer. Library.

Other editions and translations of *Institutiones medicae* are given below. Additions to this list will be gratefully received; the list of Latin editions is based largely upon a *Short-title Catalogue of books written and edited* by HERMAN BOERHAAVE, compiled by MENNO HERTZBERGER with the assistance of E. J. VAN DER LINDEN (Amsterdam, 1929, 27 pp.):

Latin editions.

Leyden	1708, 12° (described above).
Frankfurt am M.	1710, 12° (with pref. by J. P. BURGGRAF).
Leyden 2nd ed.	1713, 12° (without BURGGRAF's pref.).
Leyden 3rd ed.	1720, 12°
Leyden 4th ed.	1721, 12°
Paris 4th ed.	1722, 12°
Venice	1723, 4°
Leyden 4th ed.	1727, 12°
Leyden 5th ed.	1734, 8°
Paris 6th ed.	1735, 8°
Nürnberg 5th ed.	1740, 8°
London	1741, 4° (title, <i>Φυσιολογική</i>)
Venice	1745—47, 8° (ed. bij HALLER).
Leyden 6th ed.	1746, 8° (ed. by HALLER).
Paris Ult. ed.	1747, 8°
Nürnberg	1747, 8°
Amsterdam	1751, 8° (ed. by HALLER).
Edinburgh	1752, 8°
Amsterdam	1755, 12° (ed. by HALLER).
London	1757, 4°
Nürnberg ed. nova	1758, 8°
Vienna	1775, 8°
Valentia	1790, 4°
Madrid	1796—96, 8° (ed. SOLDEVILLE).

TRANSLATIONS.

English.

J. BROWNE (Translator), London, 1714, 8°, under the title *Institutions in Physick* (See fig. 2). This is a plagiarized translation with no acknowledgment to BOERHAAVE on the title. It is based on the text of the 2nd Leyden edition of 1713, but there are many additions by the translator.

J. BROWNE (Translator), 2nd ed., London, 1715, 8°. A reissue of the previous edition without changes.

"Mr." SAMBER (Translator), London, 1719, 8°, under the title *A Method of Studying Physick* (See fig. 3). This also is based upon the 2nd Leyden edition of 1713 (See HALLER's introduction to Amsterdam ed. of 1751). No reference is made to the

preceding translation by BROWNE and the rendering appears to be quite independent of this earlier work.

ANON. London, 1742, 8°, 6 vols., under the title *Dr. BOERHAAVE's academical lectures on the theory of physic*. This is an extensively annotated translation, probably drawn principally from the 5th Leyden edition of 1734, but it is based to some extent upon de LA METTRIE's excellent French translation of 1740. This may account for the anonymity of the translator.

ANON, another ed., London, 1766—73, 8°, 3 vols. The same translation as the preceeding issued in three volumes.

French.

J. O. DE LA METTRIE (Translator), Paris, 1740, 12°, 2 vols., under the title *Institutions de médecine*. This is an excellent and well annotated translation of the 5th Leyden edition of 1734, and is evidently the first rendering in French (unless plagiarized translations exist under other titles).

J. O. DE LA METTRIE (Translator), 2nd ed., Paris, 1743—47, 12°, 6 vols. A new edition with more extensive commentaries by de la Mettrie.

German.

JOHANN PETER EBERHARD (Translator), Halle, 1754, 8°, under the title, HERMAN BOERHAAVE *Physiologie*. This excellent translation occupies 1128 pages of text and is generally bound in two volumes. It is based upon HALLER's posthumous edition published at Leyden in 1746 and includes many of HALLER's annotations. It is significant that the original title is dropped and „Physiologie” substituted, this being the first time a German text book of physiology for medical students had borne that name. Another text edited by B. S. ALBINUS and entitled *Physiologia* was published at Amsterdam in 1758 (2nd ed., 1769), states that it was based on BOERHAAVE, MALPIGHI, and RUYSCH. MALCOLM FLEMING's *An introduction to physiology* was published at London in 1759 and is the first text in English to be so designated.

JOHANN PETER EBERHARD (Translator), 2nd ed., Halle, 1780, 8°. A new edition with many changes.

Dutch.

CORNELIS LÓVE Jz. (Translator), Amsterdam, 1745, 8°, issued under the title *De geneeskundigen onderwijzingen, vertaald en vermeerderd met aantekeningen*. This is the first Dutch translation traced. A copy is available in the Army Medical Library.

CORNELIS LÓVE Jz. (Translator), Amsterdam, 1778, 8°. Another edition of preceding.

It is probable that Italian, Scandinavian, and other Dutch translations exist, but so far none have been traced.
